

Zero Retries issue 0198 2025-04-19

Update 1 - This issue published 2025-04-18 with the title Zero Retires 0198. Oops!

Update 2 - My quick "clone and republish" broke all the internal links, now fixed.

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fourth year of publication, with 2600+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Web version of this issue - <https://www.zeroretries.org/p/zero-retries-0198>

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Request To Send

Commentary by Editor Steve Stroh N8GNJ

Welcome to Zero Retries, Amateur Radio Newsline Fans!

The unexpected (but very much appreciated!) mention of the Zero Retries Digital Conference 2025 in this week's Amateur Radio Newsline (see below) has resulted in a lot of new ZR subscribers. **Welcome!** Here are a few brief pointers:

- Details on the inaugural Zero Retries Digital Conference 2025 will be posted on the Conference page as they become available.
- For information on the GNU Radio Conference 2025 (mentioned in AR Newsline) which will precede the Zero Retries Digital Conference 2025, see <https://events.gnuradio.org/event/26/>.
- For background on Zero Retries, see the About page - including the puzzling name (to most) of this newsletter.
- Zero Retries is published via email *usually* every Friday and *usually* at 15:00 Pacific. Subscribing via email is the most reliable way to see Zero Retries as soon as a new issue is published. If you're a RSS user, there is also an RSS feed for Zero Retries.
- Subscriptions to Zero Retries are **free** (as in beer, as Linux folks like to say). For new subscribers, Substack (the platform I'm currently using to publish Zero Retries), defaults to displaying a *paid* subscription - that's how they make money. Paid subscriptions to Zero Retries are entirely optional (but appreciated) - there is no difference in content between free and paid subscriptions. For more detail about paid subscriptions, see Zero Retries Administrivia - Activating Payment Options.
- For a bit deeper background of my inspirations and motivations and perspective in starting Zero Retries, see Zero Retries 0000.
- Zero Retries has published more than 200 weekly issues, including some special (focused) issues, so there's lots of "back issue" reading available to new subscribers. Apologies that there are no compilations or indexes - yet. Those are on the To Do list.
- Zero Retries issues often run longer than is comfortable reading in email apps, especially on mobile devices. Just click the link near the top of each newsletter to view the web version of Zero Retries in a web browser.

Again, **Welcome!**

#

Paid Subscribers Update

My thanks to **Rich Stocking N7OP** for upgrading from a free subscriber to Zero Retries to a **Founding Member Subscriber** this past week!

Founding members are listed in every issue of Zero Retries!

My thanks to **Prefers to Remain Anonymous 28** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 71** for becoming an **Annual Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

#

Recent Mentions of Zero Retries Digital Conference 2025

The latest information on ZRDC 2025 is at <https://www.zeroretires.org/p/conference>

Our thanks to Lynn Burlingame N7CFO for including ZRDC 2025 in the [2025 Pacific Northwest Hamfairs & Events](#) page.

Our thanks to Cale Mooth K4HCK for nice mentions of ZRDC 2025 in both [Amateur Radio Daily](#) and [Amateur Radio Weekly](#).

Our thanks to Tom Salzer KJ7T for prominently mentioning ZRDC 2025 in [Issue 126 of his newsletter The Random Wire](#).

Our thanks to Amateur Radio Newline for a *great* mention of ZRDC 2025 in [Amateur Radio Newline Report 2477 for Friday, April 18th, 2025](#), intro'd by Jim Damron N8TMW and narrated by George Zafiropoulos KJ6VU:

JIM/ANCHOR: The Zero Retries newsletter, which offers readers articles on technology and innovation in ham radio, is branching out to host its first digital conference later this year. It will be held in Washington State. We have details from George Zafiropoulos KJ6VU.

GEORGE: September will be a big month for technology and innovation in amateur radio – and at the inaugural Zero Retries Digital Conference, many of the articles readers have enjoyed in the newsletter will come to life: Those attending can expect to hear about the IP400 Networking Project, and see demonstrations of the M17 Digital Voice/Data system and the MMDVM-TNC data system. Conference manager Tina Stroh KD7WSF expects to put out requests for presenters very soon and will make a sign-up sheet available online.

The conference will be held on the 13th of September at the Edward D. Hansen Conference Center in Everett, Washington.

The Hansen conference center will be transformed into a kind of epicenter of digital innovation at that time. The Zero Retries conference is taking place just as GRCon 2025 wraps up. GRCon is the annual conference for the GNU Radio project and community. That conference runs from Monday September 8th through to Friday September 12th. Although the two events share the same venue, they are not connected to one another.

Invitations to the Zero Retries conference are expected to be sent out shortly.

In the [Report 2477 audio file](#), the ZRDC 2025 item begins at 6:56.

Thanks very much Amateur Radio Newline folks!

Zero Retries readers - if you see other mentions of Zero Retries Digital Conference 2025, please let me know so Tina and I can thank those "mentioners".

In other ZRDC 2025 news, Tina KD7WSF and I were talking about the list of proposed speakers / presentations we've been assembling. When I added another potential presentation, Tina (in her role as Conference Manager) told me:

*"You do realize that you've proposed enough speakers / presentations to fill up **two** entire days... don't you?"*

She's right; I haven't been keeping track of all of my ideas. It's a fun problem to have so many potential interesting presentations to fill up an entire day with Zero Retries Interesting presentations.

#

Disseminated!

My two comments for FCC GN Docket 25-133 that were submitted on 2025-04-12 (a day late) are:

Filing Status DISSEMINATED

Whew!

#

Turtle Mode?

Jeff Davis KE9V expressed well the opposing view to my perspective on whether Amateur Radio *should* comment on FCC GN Docket 25-133:

Silence is Golden:

In the current unhealthy environment for any federal service perhaps the amateur radio would be de-regulated anyway, but in this instance I think we might have been better served by remaining mum without drawing any undue attention to ourselves. You know, maybe fly under the radar just this once. But no, hams have a long history of opening mouth before engaging brain and when it comes to commenting online, the gas valves are wide open and hams have apparently flooded the FCC with comments on this matter...

Another perspective was offered in by Anthony Good K3NG (which was also pointed out by KE9V):

It's Delete, Delete, Delete, not Create, Enhance, Advance

ARRL responded to the FCC Delete, Delete, Delete initiative with a wishlist including the elimination of several digital limitations, licensing changes, and the implementation of a 22 year old WRC / ITU third party traffic treaty requirement. I'm not sure if ARRL was attempting to appear like they're doing something or if they're just incredibly naive and couldn't put two and two together with the current political climate. The purpose of Delete, Delete, Delete is not an opportunity to advance the radio art, increase technology enjoyment, or enhance the next generation of radio amateurs. It has merely two purposes: 1) slash costs at the FCC and 2) facilitate commercial interests and revenue through the elimination of regulations. It's that simple.

Reasonable people can agree to disagree and I certainly respect KE9V's and K3NG's opinions and of course, they have every right to express them. Before making my decision to comment on FCC GN Docket 25-133, I very soberly considered that same perspective. Ultimately I decided that I'd rather "stick my neck out" to offer my comments and perspective for this perhaps once-in-a-decade opportunity to say something directly to the FCC about modernizing (and the overall value of) US Amateur Radio.

As I said in Zero Retries 0197:

In the end, my comments were just the opinions of one individual, among many, and I don't expect my comments to be given any more "weight" than any other commenter...

But, it's a *certainty* that my comments (and those many others also who commented) will certainly be given more (whatever) consideration... than those who chose Turtle Mode and didn't comment.

#

N8GNJ Presentation for Jim Fisher Memorial Digital Network Association (JFMDNA)

I was honored to be asked to do a presentation for this group on Monday, 2025-04-21 at 19:00 - 21:00 Eastern via teleconference. The presentation is titled:

IP400 and the Digital Future of Amateur Radio.

The [JFMDNA](#) has worked to build Amateur Radio data infrastructure such as AREDN (microwave) networks in the region around Philadelphia, Pennsylvania. But, Eastern Pennsylvania's trees and Philadelphia's urban landscape can make building Amateur Radio microwave links and networks problematic. Thus JFMDNA is interested in learning more about the IP400 Network Project, which operates in the Amateur Radio 420-450 MHz band, as another technology for building out Amateur Radio data infrastructure.

I'll also touch on a number of things I regularly discuss in Zero Retries, including my comments on FCC Docket GN 25-133, my new perspective on Amateur Radio and Software Defined Radio technology (see below), and a number of other topics.

If you're interested in viewing my presentation live:

<https://us06web.zoom.us/j/83599568323pwd=UyEWIOZDWe40DhtmK95Lgx4buuisb3.1>

(Some web browsers that I've tested this link insist on breaking it into two lines and rendering it invalid. Instead, [try this link](#).)

The presentation will be recorded and made available publicly on the JFMDNA YouTube channel - <https://www.youtube.com/@JFMDNA>.

#



Image courtesy of SEA-PAC conference and designer Ivan Loock N7PRM.

N8GNJ SEA-PAC Seminar - Technical Innovation Within Amateur Radio

The seminar schedule for [SEA-PAC 2025](#) has been finalized (but not yet [posted](#)). My seminar title (which SEA-PAC modified) is **Technical Innovation Within Amateur Radio** will be on Saturday 2025-05-31 from 13:00-13:50 in the “Seaside A” room.

Mine is one of three seminars that were chosen (not at my request) as alternatives to the ARRL Forum (which usually has overflow attendance). The seminar schedule is full so there weren’t any other slots available.

[SEA-PAC](#) is the largest Amateur Radio event in the Pacific Northwest, and it will be held this year 2025-05-30 thru 2025-06-01 in Seaside, Oregon, USA. As I’ve mentioned numerous times in Zero Retries, SEA-PAC and Seaside, OR is a family favorite, being on the beautiful Oregon Pacific Coast.

###

Credit Where Due - “Seattle” Inspirations for IP400

Earlier this week when Martin Alcock VE6VH, the developer of the IP400 Network Project was giving me a remote demonstration of some features of IP400, I had a flashback.

For some of what I envisioned for IP400, I credit the wild and wooly bunch of packet radio geeks that I hung out with for so long in the Seattle, Washington area. More than two decades ago now, I remember sitting at a table at a Saturday brunch where Ken Koster N7IPB and Dennis Rosenauer (now) AC7FT showed off their design for a “simple” black box *data* radio that was essentially Ethernet in / radio out. No front panel (maybe a few indicators), etc. One of the major features of that imagined radio was that the various radio parameters - frequency, transmit power, bandwidth (channel size), modulation method, etc. were all settable parameters from a menu¹.

I saw all of that in this recent demo of IP400!

We couldn’t do such a radio then - the technology wasn’t available or affordable, and that group wasn’t organized enough to pull it off.

Years later, some of the same folks, using those earlier ideas, attempted to develop the [NW Digital Radio UDRX-440](#) as a commercial product. It too was a “black box” radio with Ethernet in, RF out, but ultimately that project was terminated by NW Digital Radio.

Both of those projects were just too ambitious for the technology of that moment. For example, both projects predated Raspberry Pi computers that would have made both projects much more viable.

In *this* era, we have the combination of capable radio chipsets and small, powerful computers running a well-developed powerful Linux operating system that are inexpensive enough to dedicate to a radio. For Amateur Radio², such computers are not “nice to have”, they’re critical because you can move functions that used to require expensive, static hardware into commodity (as opposed to embedded) software - protocols, modems, networking, etc. Raspberry Pi has even made it easy to integrate a RPi into a system board - the Raspberry Pi Compute Module(s).

Selfishly, I hope that IP400 will rekindle some renewed interest for data networking on 420-450 MHz in the Seattle area and the Pacific Northwest³, including (I hope) adding data communications via repeaters back into the mix of available services for Amateur Radio. Western Washington has both the great [HamWAN](#) and some AREDN microwave networks / groups such as [NW Mesh](#), but microwave networking only works if you have unobstructed line of sight paths. Given the tree “problem” here in the Pacific Northwest, 400 MHz propagation is more usable. Thus VE6VH and I view IP400 not just as an easier way to start doing higher speed networking in small groups, but also the use of 400 MHz as a good complement to microwave networks.

Thus I wanted to acknowledge the debt I owe for my ideas about black box data radios. Those of you who were also part of those early discussions in the Seattle area, know that those ideas lived on and materially contributed to the IP400 Network Project.

##

Discourse vs...

One element of the long term plan for Zero Retries is to develop a Zero Retries Online Community (ZROC). (*Not imminent* - too much going on at the moment.) One primary requirement for the ZROC is that such a system must be a hosted system with pro (responsive) support available as I want ZROC to be an *adjunct* to Zero Retries, not a full time job in itself managing it.

Thus I passively “keep an eye out” for ideas for online community systems that would be suitable for ZROC. In my reading, I’m acutely embarrassed to learn that I have been mentally conflating the many references I’ve read about the [Discourse](#) online community system with the [Discord](#) online community system. I’m a fan of Seth Godin and a recent blog post - [The use \(and design\) of tools](#) set me straight:

Some tools, like Discord, are optimized for informal poking and casual use. As a result, more nuanced and sophisticated (and powerful) tools like Discourse are harder to sell to new users.

I know there are many fans of Discord within the Zero Retries community, and folks, I’ve *tried* to use Discord, but for me, it’s just too “busy”, and ends up to be too much of a time sink. Ditto other online community systems like Slack, Campfire, Teams (shudder...), etc. Thus Discourse, and the strong recommendation by Godin, seems like a significant contender for the Zero Retries Online Community.

##

Thanks to Joe Hamelin W7COM

Tina and I wanted to thank Joe Hamelin W7COM (Zero Retries Founding Member 0014) for a very thoughtful gift of a pair of TIDRADIO TD-H3 portable radios. Those are very interesting little units, and amazing technology for the low price!

Joe also offered some very kind words of encouragement to both myself and my wife Tina KD7WSF for the work we both put into Zero Retries publishing regularly, and now the challenge of the Zero Retries Digital Conference 2025.

##

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

Steve N8GNJ

Leave a comment

Share

IP400 Update 2025-04-18

By Steve Stroh N8GNJ

I'm flying solo for this update as my IP400 Co-conspirator Martin Alcock VE6VH remains heads-down in intense ~~development~~ pre-production on IP400.

Reiterating from the IP400 [email list](#):

Again, apologies for the public quiet on IP400 but rest assured, there is a lot going on behind the scenes. April 2025 is definitely going to be the calm before the storm.

I've been authorized to offer this... *tease* in this issue of Zero Retries:

As of 2025-04-18, development on the IP400 Network Project is past the prototype phase and has transitioned into the pre-production phase. There will be a significant announcement regarding IP400 in two weeks - 2025-05-02.

Also from the IP400 email list:

Martin VE6VH and I talk regularly and one of the things that came out of our discussion [Monday] (on my part) was that it's likely going to counterproductive and too time consuming for IP400 to have a special mode (that I humorously, and a bit bitterly called SAFAUSR - Silly Accommodation for Arcane US Regulations) mode just for US operation. No other country has need of that mode, especially Canada, where IP400 is being developed, so the antiquated US Amateur Radio regulations deservedly get little sympathy.

There's no reasonable possibility that the US Amateur Radio regulations will get updated in 2025, and I'm unwilling to wait to experiment with the full potential of IP400.

So whatever it will take, concurrent with the widespread availability of IP400 hardware, which we've publicly stated will be Summer 2025, I plan to submit a request to the FCC for Special Temporary Authority to use bandwidth > 100 kHz and symbol rates > 56,000 in the US 420-450 MHz Amateur Radio band to conduct testing of IP400.

Not to mention that I fully expect to be able to do some cross border testing of IP400 given that I'm located only 20 miles South of Canada (Vancouver, BC area) where I'll guess there will quickly be some IP400 experimentation... and they definitely won't be interested in "SAFAUSR mode".

I will structure the STA so that others in the US can easily join the STA so that they too can operate IP400 "wide open".

I don't have details yet. I don't even know how to submit an STA; I only know it's doable because I previously participated in one with TAPR in doing Spread Spectrum testing.

I wanted to get this discussion about an STA going now.

My intent with that message was just a general "heads up" to those in the US interested in IP400, but I got a number of replies on the list from folks that wanted me to "count them in". Thus instead of me parsing out those interested from the email list, I created a Google Form to collect more information:

<https://forms.gle/FK3XxtuDc21oAdwc9>

I can say that what I've seen behind the scenes in IP400 and its longer term development plan has me excited.

I really think that IP400 Network Project, and especially the progression path for further development (that we've only revealed parts of) really will be the *Packet Radio Revolution of the 21st Century*.

Leave a comment

Share

Software Defined Radio is *THE* Imperative for US Amateur Radio

By Steve Stroh N8GNJ

One of the quotes that I used to include in every issue of Zero Retries⁴ was:

Ultimately, amateur radio must prove that it is useful for society.

Dr. Karl Meinzer DJ4ZC

Now, more than ever, US Amateur Radio "must prove that it is useful for society". Not just for "communications of last resort". Not just for "international goodwill", and the other elements of [§ 97.1 Basis and purpose](#). US society is now irrevocably *dependent* on its radio technology - mobile broadband, Wi-Fi and other localized radio systems, and satellite technology including broadband like Starlink and "mobile coverage of last resort" like [AST Space Mobile](#). Radio technology *is our communications infrastructure* - we don't have a fallback plan like (analog) landlines any more. Most of society in the 2020s has never seen (or needed to) an Ethernet cable for hardwired connection to the Internet.

And, sometimes we die when our radio technology doesn't work, like an elderly person's panic button failing during a storm, or home Wi-Fi getting jammed by intruders disabling security cameras that use Wi-Fi, or a hospital's internal mobile phone networking getting hacked. Or *warfare*, where the loser is increasingly the side with the inferior radio technology, such as their drone or ground troops communications being jammed.

Whatever the cause (which can be endlessly debated), in 2025 the US is in an existential competition with China for "dominance" in critical radio technologies. We *have* been in such a competition for *years*. What's different now is that prior to 2025, China was willing to "play nice" with the US (including work with international standards bodies for wireless systems like Wi-Fi, mobile phones, Bluetooth, etc.) to be able to sell into the largest market in the world for the devices it designs and manufactures.

Thus prior to 2025, the US had the benefit of new radio technology without any significant effort as Chinese vendors were eager to develop or subcontract, and manufacture nearly any conceivable radio technology, and pay at least lip service to US specifications, standards, and regulations.

Now, in 2025 and beyond, China is no longer willing to "play nice" with the US. Push has come to shove between China and the US. Soon, China will

begin creating its own radio technology specifications without regard to international cooperation and standards bodies. If you think this perspective is alarmist, look at the example of the just announced [GPML video interface standard](#) which was developed *solely* in China, to be manufactured *solely* by Chinese companies, to be incorporated *solely* into Chinese products.

Radio technology is, in my opinion, one of the primary technological infrastructures that is vital for the US to be able to manage and control for its domestic use. Thus we'd better get better (a lot better) about radio technology in the US.

I think someone is going to make the case... *soon*... that we need to *significantly* encourage the development of radio technology expertise (which now, *is Software Defined Radio*) the same way we used to encourage math and science in the post-Sputnik era, computer literacy by teaching computer skills, beginning programming, and parents (that could afford it) buying early home computers.

My New Perspective - SDR Technology is *the* Imperative for US Amateur Radio

I spent much of Monday 2025-04-14 reading Comments to the FCC in Docket GN 25-133 and corresponding with various folks via email about 25-133. Over the course of that day, a new perspective gradually clarified from what apparently was a background task in my mind:

Either US Amateur Radio will reorient itself for Software Defined Radio technology to be its primary focus... or unlicensed users that want to experiment with SDR will eventually be enabled to operate in US Amateur Radio spectrum above 30 MHz on a secondary or tertiary basis.

In US Amateur Radio, in the present day, other than for a smattering of bleeding edge experimenters, Software Defined Radio (SDR) technology is, at this moment, a “nice to have” abstract “feature” for most Amateur Radio Operators, because “SDR” is buried deep inside the shiniest, most expensive HF radios. The presence of “SDR” enhances, but doesn’t really change the traditional function (or even look) of those shiniest, most expensive HF radios.

But *real* SDR, where the *user*, not just the manufacturer, can fundamentally change the function of the radio hardware to add new capabilities, isn’t the wave of the future... *it’s the wave of the present*. Just look at the fundamental capabilities of the Software Defined [HF Signals zBitx](#) versus the [FlexRadio FLEX-8400M](#) and look for the presence or absence of one indicative key feature...

*Does the “Software Defined Radio” include the innovative, robust, **Amateur Radio developed FreeDV mode** (or can FreeDV be added into the **radio**)?*

- The \$200 zBitx? **Yes!**
- The \$3650 FLEX-8400M? No.

The presence or absence of FreeDV is a primary indicator for my “is it really SDR?” test⁵ because:

1. FreeDV is a significantly superior capability from analog voice modes on HF spectrum, and
2. FreeDV is implemented entirely in software, and
3. FreeDV was developed by Amateur Radio for Amateur Radio for a specific use case (Amateur Radio HF bands) that wasn’t derived from a commercial system.

From now on I’ll call this the “FreeDV test”.

SDR versus traditional “hard coded” radio (where, even if “SDR” is present, the user cannot change the functionality of the radio by adding or changing software) is akin to the emergence of microprocessors versus minicomputer and mainframes, Linux versus Windows, Internet versus telco, *even electricity versus steam*.

Software Defined Radio is Disruptive Technology

Again, this perspective emerged on Monday in my mind pretty fully formed, seemingly out of “nowhere”. But I can recall when I encountered some of the disparate bits and pieces of my perspective above. For example, this piece from a [recent Stratechery newsletter](#):

The Disruption of American Manufacturing

The late Professor Clayton Christensen — [one of my personal heroes and inspirations](#) — coined the term disruption in a seminal paper called [Disruptive Technologies: Catching the Wave](#), which he expanded to book-length in [The Innovator’s Dilemma](#). However, Christensen’s most concise summary comes from [this 20-year retrospective in Harvard Business Review](#):

“Disruption” describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent businesses. Specifically, as incumbents focus on improving their products and services for their most demanding (and usually most profitable) customers, they exceed the needs of some segments and ignore the needs of others. Entrants that prove disruptive begin by successfully targeting those overlooked segments, gaining a foothold by delivering more-suitable functionality — frequently at a lower price. Incumbents, chasing higher profitability in more-demanding segments, tend not to respond vigorously. Entrants then move upmarket, delivering the performance that incumbents’ mainstream customers require, while preserving the advantages that drove their early success. When mainstream customers start adopting the entrants’ offerings in volume, disruption has occurred.

The focus of that Stratechery article is semiconductor manufacturing, but it reminded me of how prescient Christensen was in explaining Disruptive Technology when I read Innovator’s Dilemma decades ago.

Software Defined Radio is disruptive technology.

In Amateur Radio, and personal radio technology experimentation in general... including university students, hobbyist software developers, “hackers”, “makers”, IT professionals, etc. SDR technology will steadily, inexorably “grow from below” to become not just be the dominant technology in Amateur Radio, *but to be the only technology and operating mode of any significance in Amateur Radio*.

I had previously included in that phrase “*slowly, steadily*...” but I don’t think that “slowly” is accurate. This trend has been happening for some time, it’s happening now, and the pace of innovation in SDR is increasing rapidly.

This personal development of expertise in Software Defined Radio technology is already happening organically. For example, look at what is happening with the open source [Flipper Zero](#):

Customizable radio platform

Sub-1 GHz Transceiver

This is the operating range for a wide class of wireless devices and access control systems, such as garage door remotes, boom barriers, IoT sensors and remote keyless systems. Users can expand their Flipper Zero capabilities by installing additional apps to read data from various devices including weather stations.

Flipper has an integrated multi-band antenna, and a CC1101 chip, making it a powerful transceiver with a range of up to 50 meters. CC1101 is a universal transceiver designed for very low-power wireless applications. It supports various types of digital modulations such as 2-FSK, 4-FSK, GFSK and MSK, as well as OOK and flexible ASK shaping. You can perform any digital communication in your applications such as connecting to IoT devices and access control systems.

The current Flipper Zero currently uses a semi-fixed function radio chipset, and with that “simple” hardware, its users are already finding significant vulnerabilities in radio systems. For example, it’s pathetically easy to clone the “key fobs” of some cars.

It’s just a matter of time before the “Flipper One” or perhaps the “Flipper Two” makes use of a fully Software Defined Transceiver chipset. That’s not a stretch - I’ve seen the [ADALM-PLUTO Software Defined Transceiver](#) connected to an Android Smartphone for a *completely handheld Software Defined Transceiver*. The ADALM-PLUTO is (as I type this) [about \\$235 from Mouser](#).

Another example is the prototype [OpenHT](#) - a handheld Software Defined Transceiver that was developed as part of the M17 Project.

Two other examples are the [CaribouLite RPi HAT](#) and the [SXceiver6](#) which are both Software Defined Transceivers that are the same form factor as a Raspberry Pi Zero to make a compact, inexpensive Software Defined Transceiver and computer.

We’re in the Software Defined Radio era now, folks!

Yes, these examples above are clunky assemblages of a radio board and a computer board, and power-hungry (by portable radio standards). But imagine these re-laid out onto a single board that can accept a Raspberry Pi Compute Module. The [Raspberry Pi Compute Module 5](#) is only \$45. The SDR radio chipsets, the compute capability⁷, and the battery capability keeps getting better by the month.

The Chinese Amateur⁸ (?) radio manufacturers are now tinkering at the margins of SDR and some are now openly advertising that their portable radios can be flashed with third party open source software. There’s only so much software tinkering that can be done via the firmware for these fixed function radio chipsets that are designed for analog or digital *voice*. Soon enough there will be a successful design (probably open source) for a portable Software Defined Transceiver like the OpenHT.

But as interesting and useful in self-education as the Flipper Zero, Meshtastic, LoRa, OpenWRT, ADALM-PLUTO, OpenHT, CaribouLite RPi HAT, SXceiver, and hackable Chinese portable radios all are... the casual experimenters using all of those systems will be told that there’s only a few places in the spectrum where they’re “allowed” to experiment such as unlicensed bands like 433 MHz (Europe) and 902-928 MHz (US / Canada) and 2.4 GHz.

Experimenting with radio technology only in those unlicensed bands is the equivalent of trying to learn computer technology and programming while being stuck with a microcomputer like the [Sinclair ZX-80](#). No question that those with ZX-80s could learn the basics, and do amazing things given the limitations of that system... but there are real world limits with the ZX-80.

*Thus I really believe that **someone**, is going to combine these elements and make a compelling case:*

- The US needs to encourage self-education in Software Defined Radio technology using...
- The inexpensive, increasingly capable, experimenter-friendly Software Defined Transceivers, and
- Make a credible case that “hard” band limitations and confining on-air experimentation to a few selected unlicensed bands doesn’t make any sense for those that want to experiment and learn and grow their skills and test new radio technology and systems at low power.

The powers-that-be sure don’t want these experimenters tempted to “freelance” anywhere from 30 MHz to 2 GHz that these Software Defined Transceivers are capable of.

So... it makes sense to tell these university students, hobbyist software developers, “hackers”, “makers”, IT professionals, etc. that if they gotta experiment *somewhere* in the spectrum to develop new radio technologies, it’s OK to experiment in *Amateur Radio spectrum* because *that’s a good place for experimentation*.

US Amateur Radio just hasn’t caught up to this stuff.

The most hopeful scenario I can foresee, if US Amateur Radio doesn’t get its act together about SDR technology, is that Amateur Radio could continue as it is right now, but unlicensed users / experimenters could be allowed to use Amateur Radio spectrum above 30 MHz (because FCC doesn’t have to coordinate that internationally, other than space use).

Amateur Radio = Citizens Experimental Radio Service

The most pessimistic scenario I can foresee, if US Amateur Radio doesn’t get its act together about SDR technology, is that US Amateur Radio is completely deregulated - no testing, no licenses, only minimal regulations, almost anything goes, though I can imagine that the FCC will limit transmit power. Amateur Radio would become the Citizens Experimental Radio Service.

To reiterate a few themes previously mentioned:

- Ultimately, amateur radio must prove that it is useful for society.
- The US had better get better (a lot better) about radio technology in the US.

- Software Defined Radio technology is *the* imperative.
- Either US Amateur Radio will reorient itself for Software Defined Radio technology to be its primary focus... or unlicensed users that want to experiment with SDR will eventually be enabled to operate in US Amateur Radio spectrum above 30 MHz on a secondary or tertiary basis.
- Software Defined Radio is disruptive technology, like microcomputers disrupted minicomputers, Linux disrupted Windows, electricity disrupted steam, etc.
- We're **in** the Software Defined Radio era **now**, folks!
- The powers-that-be sure don't want these experimenters tempted to "freelance" anywhere from 30 MHz to 2 GHz that these Software Defined Transceivers are capable of.

I'm going to be able to figure out who the "winners" (survivors) in Amateur Radio manufacturing will be in the coming decade by seeing what Amateur Radio manufacturers show up at [GNU Radio Conference 2025](#). Yeah, it's going to be a bit rough for non-US folks to travel to the US for GRCon 2025, but SDR is an existential tipping point within Amateur Radio. I really think that what it's down to in 2025 is:

Is your system (radio) using (real) Software Defined Radio technology?

If not, it's irrelevant.

And we'll also have a primary indication if this perspective has taken hold in the ARRL by seeing whether ARRL shows up at GRCon 2025 to showcase Amateur Radio and engage with the bright folks (especially the students) attending GRCon 2025.

K3NG's "Inconvenient Reality"

To conclude this article, Anthony Good K3NG offered an [interesting perspective](#). I've quietly shared this same perspective a few times, particularly in considering testing and use of advanced data modes such as IP400 and New Packet Radio on 420-450 MHz that operate at > 56,000 symbols per second or occupy > 100 KHz bandwidth (which are the current limits of those parameters in FCC Part 97 regulations):

Regarding outdated FCC digital rules, here's a little inconvenient reality I'm just going to throw out there: if you're an experimenter and you want to unleash some new mode that exceeds bandwidth or symbol rate rules, be like Nike and JUST DO IT. Seriously. Just don't QRM anyone. The FCC isn't going to do anything. Both the FCC and ARRL have been totally oblivious to the de facto encryption in digital voice modes over the years, a clear rule violation. ARRL has never been a champion of open systems or taken the lead with digital technology standards⁹. If you're running some digital mode that runs afoul of FCC rules ARRL might send you a sternly-worded letter and complain to the FCC. When was the last time the FCC busted a ham for intentional technical violations?

Yep!

Given the length of this article, and ample controversy already, I wasn't planning to offer that perspective in this article. But K3NG has a very valid perspective, said it well, and thus completeness of this topic really compels such a mention.

I'm absolutely sure *that this scenario is happening now*, by Amateur Radio Operators, folks who aren't Amateur Radio Operators, and quite possibly radio technology companies testing stealthy radio modes.

During the Packet Radio STA period, I was contacted by a ham located in Southern California doing a stealth development project intended for Amateur Radio use that used Frequency Hopping Spread Spectrum (FHSS). The dwell time of each hop was around 100 mS. At a point, this person decided to put their system to the ultimate test of compatibility with existing Amateur Radio Operations. They programmed the hopping pattern to land on the input frequency of Southern California repeaters, and launched the test on a Saturday evening when every repeater was in use for "energetic conversations"¹⁰.

To the developer's amazement... *no one noticed that the FHSS signal*. 100 mS blips on a radio channel *might* be noticeable if you're *expecting them and listening for them*, or detectable with test equipment, but not in the course of typical repeater usage.

That experiment was a one time event (at least, that's what the developer told me), and that FHSS project never went beyond the development stage. But, I've always wondered what would have happened if indeed a group began using such a FHSS system under an "Ask for forgiveness rather than permission" paradigm. Perhaps they could operate it long enough, and document it well enough, to conclusively demonstrate "no harm done using FHSS" on Amateur Radio VHF / UHF bands.

I thought about this story as I was listening to the tales of the (fictional) [Cornbread Road Technical Society](#). I bet the bright folks of CRTS could have developed a FHSS mode for their internal communications.

IP400 and Software Defined Radio

Lest you think that I'm playing both sides of the SDR "fence" here, in simultaneously making these observations, while promoting and helping to develop IP400 based on a "hardware" radio chipset... **nope**. One of the things I'm going to be promoting after we get a reasonable amount of IP400 hardware out into widespread use is to insure that we have a very well defined specification so that IP400 can get ported into GNU Radio to enable even more widespread experimentation and evolution of IP400 beyond what Martin and I could have imagined.

And... What will be released for IP400 in Summer 2025 is only the very first Minimum Viable Product (MVP) to demonstrate the concepts of IP400. There is a long roadmap already laid out for IP400 evolution, including IP400 units having Software Defined Radio capabilities.

Leave a comment

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Some Selected Comments from FCC Docket GN 25-133

By Steve Stroh N8GNJ

View the cumulative Comments and Reply Comments on FCC GN 25-133:

[https://www.fcc.gov/ecfs/search/search-filings/results?q=\(proceedings.name:\(%2225-133%22\)\)](https://www.fcc.gov/ecfs/search/search-filings/results?q=(proceedings.name:(%2225-133%22)))

Tip: For easier browsing, click the 100 icon to list items 100 at a time.

Also, note that there is an RSS feed for GN 25-133:

[https://ecfsapi.fcc.gov/filings?q=\(proceedings.name:\(%2225-133%22\)\)&sort=date_disseminated.DESC&type=rss](https://ecfsapi.fcc.gov/filings?q=(proceedings.name:(%2225-133%22))&sort=date_disseminated.DESC&type=rss)

The RSS feed is a bit shallow, only showing new additions from the past few days.

I had lots of company in filing my comments late.

Things I could have done better, and neglected to mention in my GN 25-133 comments

- I made no mention of Zero Retries or the role it's beginning to play in the discussion of 21st century Amateur Radio - technology, operations, new Amateur Radio Operators coming into Amateur Radio from different backgrounds and with different expectations, etc. That was a total brain fart on my part, and I was mildly chastised about that omission by a few Zero Retries readers.
- I neglected to mention that I'm also a GMRS licensee.
- I'm appalled at the number of typos in my comments. At that point I was just tired and wanted to get it submitted, get the minimalist issue that Zero Retries 0197 was going to be, published, and then *stop thinking about GN Docket 25-133* for at least a day or two.
- I wish I had commented on:
 - Blocked ranges on scanners and other receiver units from the era of mobile phones using analog FM and could thus be received by scanners. Not now (digital and encrypted) and much lower power, so these exclusions from scanners aren't needed:
 - 824 - 849 MHz
 - 869 - 894 MHz
 - 956 - 1240 MHz
 - White Spaces systems - digital TV transition has rendered the "Mother May I" command and control and central databases of television stations obsolete, and we have much, much better receiver technology now. But it's probably too late. But it might be cool to be able to opportunistically use television white space for low power systems.

A smattering of interesting and relevant comments:

[Board of Directors, Amateur Radio Digital Communications](#)

This was a great set of comments, reflecting ARDC's unique perspective on Amateur Radio.

[Amateur Radio Safety Foundation, Inc.](#)

Another great set of comments that explained very well Winlink's role in emergency communications despite being constrained to narrow portions of HF spectrum where automatic control is specifically allowed. It also inserted several (well-considered) zingers that the two fastest data communications modes available to civilians and Amateur Radio Operators - Pactor 4 and VARA HF *were developed outside the US*.

[ARRL](#)

Some elegant turns of phrase by ARRL Washington Counsel David Siddall K3ZJ:

Today in the Amateur Service many radios are run solely or principally by software. The soldering iron and discrete physical components used in past experiments often are replaced by a personal computer and coding knowledge to experiment with new techniques and functions.

Delete Symbol (Baud) Rate and Bandwidth Limitations (WT Docket No. 16-239)

In November of 2023, the Commission adopted a Further Notice of Proposed Rulemaking (FNPRM) in which it proposed to remove the symbol (baud) rate and bandwidth limits on specific Amateur LF and VHF/UHF bands.⁴ As set forth in its Comments and Reply Comments, ARRL supports the deletion of these unnecessary restrictions as proposed by the Commission because these limitations encumber Amateur experimentation with new modes and techniques without countervailing benefits.

The comments filed indicate unanimous support for deleting the symbol (baud) rate as the Commission proposed. The vast majority of commenters also supported deleting bandwidth limits.

Given that the comment cycle on this FNPRM was completed over a year ago, we request that the Commission act without further delay to adopt the rule changes as proposed.

This is *the* primary issue, to me, in modernizing US Amateur Radio for the 21st Century and ARRL is the only entity, besides me (that I've seen to date), to make this case in FCC Docket GN 25-133.

The interests of young STEM candidates understandably lean toward digital technologies and the accompanying computer programming aspects. This is what they grow up learning, and this is where developing knowledge and expertise is most likely to lead to good job opportunities, public service, and development of future innovations and services. These purposes are at the core of amateur radio as set forth

in the Commission's Rules, yet roughly one-half the amateur population cannot participate in the promise and opportunities presented on the frequencies of interest.

See ARRL, Petition for Rulemaking, RM-11828 (filed February 28, 2018).

In recognition that Technician is the entry level and that entrants have a wide variety of interests that are not being met by the outdated restrictions on Technician class privileges, ARRL proposed to add limited digital and voice privileges on frequencies below 30 MHz where distant connections are possible.

Other individual filings relating to Amateur Radio that were well spoken. (With 800+ comments, I could not read them all, apologies to those that I didn't see.)

[John Burwell KI5QKX](#)

[Paul Elliott WB6CXC](#)

[Ria Jairam N2RJ](#)

[Ward Silver N0AX](#)

Some other interesting comments not related to Amateur Radio:

[WISPA - Wireless Internet Service Provider Association](#), included this interesting mention:

Access Broadband over Power Lines ("BPL") was proposed in the 1990s as an alternative to dial-up Internet access and later as a potential competitor to cable modems. But it had several fatal flaws. One is that it was limited in speed; it does not meet today's definition of "broadband." Another is that it required bypassing transformers, which proved uneconomical. Another is that it produced significant interference to HF band users. Thus, there are no known Access BPL systems in use or being manufactured. Subpart G of Part 15 is thus obsolete and should be deleted.

[Intelsat](#) wants to remove the FCC's 2 degree GEO spacing requirement. More room for more GEO sats might equate to more room for Amateur Radio GEO above the Americas?

[Cisco](#) wants the ability to use the 6 GHz band on cruise ships.

[Wireless Microphone Spectrum Alliance \(WMSA\)](#) wants to use "white space" spectrum with fewer regulations.

[Boeing](#) says you shouldn't need a GROL to work on aircraft radios.

Some themes I observed:

- Amateur Radio Operators as individuals shouldn't have their physical addresses posted for public access. That's a valid knock on US Amateur Radio. In the 20th century, addresses (and birthdates!) weren't easily accessible except by purchasing the Amateur Radio Callbook. But in the Internet era... Publicly listing an Amateur Radio Operator's address used to be justified by needing to find your physical station in case of interference, but that no longer fits a very common use case - portable / mobile operation mostly or all.

I agree that it's time to push for that change. That won't fix the problem for those us existing hams as a lot of entities cache FCC records, especially addresses - like QRZ.com. But after that's fixed, getting an Amateur Radio license won't subject new hams to the legitimate fear of their address being exposed.

- Amateur Radio Operators offered a spirited defense of "not deleting" Amateur Radio and especially not removing any spectrum from Amateur Radio - keep Amateur Radio just as it is. Many offered examples of specific emergency communications use of Amateur Radio.
- There were many Amateur Radio commenters that suggested changing (adding) regulations to Amateur Radio, which wasn't the intent of the 25-133, but most such comments seemed well-intentioned.
- The main theme that I've observed so far is that there are a lot of good ideas being suggested, and relating to Amateur Radio, in 25-133, the FCC received a numerous good ideas from different orgs and individuals.

Thus I wish my imagined "Ad Hoc Coalition for 21st Century Amateur Radio Regulations" could become a real thing.

Archiving 25-133 Comments into DLARC for Posterity

Kudos to Kay Savetz K6KJN who is valiantly trying to preserve all of these comments for posterity in Digital Library of Amateur Radio & Communications -

<https://archive.org/details/fcc-ecfs?tab=collection&query=25-133&sin=TXT>

Thank you very much for doing this Kay!

Remember that Reply Comments on FCC GN 25-133 are due Monday, 2025-04-28.

Please join me in submitting substantive replies, especially to endorse those, like the ARRL's comments, that were constructive and forward-looking. With some grace, I'll have my Reply Comments ready in time for Zero Retries 0199 next Friday.

Leave a comment

Share

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

[APRS Summit 2025 - APRS Foundation's First-Ever Education Summit!](#)

From the APRS Foundation website:

Introducing the APRS Foundation's First-Ever Education Summit!

Mark your calendars! On **May 10, 2025**, the APRS Foundation is launching its **first-ever online education summit**, bringing together **radio enthusiasts, innovators, educators, and technologists** from around the globe. This **groundbreaking event** is designed to **empower, educate, and inspire** anyone interested in **Automatic Packet Reporting System (APRS)**—from beginners to seasoned operators.

What to Expect:

- ◆ Expert-led sessions on **APRS fundamentals, cutting-edge applications, and the future of packet radio**
- ◆ Interactive Q&As with **top minds in the APRS and amateur radio community**
- ◆ Networking opportunities with **like-minded enthusiasts**

Whether you're just discovering APRS or you're a veteran looking to **expand your knowledge and capabilities**, this event is for you! **Join us on May 10, 2025, for a full day of learning, collaboration, and innovation—all from the comfort of your home.**

Stay tuned for speaker announcements, session details, and registration info.

No other details as of this issue of Zero Retries.

This Zero Retries Interesting event slipped past me. It's now also added to the Zero Retries Guide to Zero Retries Interesting Events.

###

[AREDN Release Candidate Available](#)

Nightly build 20250415 has been designated the release candidate for the next production release.

In it the AREDN® team is introducing Babel as a replacement for the older OLSR routing technology. It's been seen to improve network stability and throughput. In this release Babel and OLSR will run side-by-side, with Babel routing used where available, and OLSR used otherwise. Already 25% of the nodes on the network are running a Babel-enabled nightly build and we've seen and heard anecdotally of significant improvements in network stability.

Additionally this release adds PtP (point to point) and PtMP (point to multipoint) RF modes to complement our existing AdHoc mode. We've see notable throughput and latency improvements when using these modes, especially with 802.11ac devices. This holds true even when mixing radios from different manufacturers.

Assuming no big issues arise (and it's been very calm the last couple of months of nightly builds) we expect the production release to occur early next month.

We believe this is a great release candidate. But we encourage you to install it on your nodes where you can; we want to hear from you what you think of it!

I'm glad to read that replacing OLSR with Babel in AREDN is working out as well in practice as it did in testing. I shot a quick question to AREDN Ambassador Orv Beach W6BI about what, specifically was different about the PtP and PtMP modes, and he replied:

When an ARDEN node is configured for PmP or PtMP mode, it ignores other stations not configured to talk to it.

W6BI also mentioned:

With 802.11ac devices on each end, we've seen up to a 70% improvement in throughput.

Once these changes are fully implemented (as in OLSR is deprecated and PtP and PtMP modes are proven in the field, a lot of folks who were dismissive of AREDN as "too chatty / not stable enough" would probably be well-served to give it another look.

###

[A Vision for Open Innovation: ARDC's Strategy at a Glance](#)

Rebecca Key KO4KVG on the ARDC website:

The Bigger Picture

Rooted at the intersection of traditional amateur radio (AR) and the emergence of the Internet, with one 'foot' planted in AR, and the other planted within the larger context of digital communications (DC), we aim to build on the overlap between AR and DC, fostering innovation

through freely available, open, and collaborative methods. By embracing both wired and wireless DC, our focus is on unlicensed or easily licensed spectrum, ensuring that experimentation and deployment are not restricted by gatekeepers.

With all of the above in mind, our goal is to empower makers, hackers, and/or developers to utilize freely available tools, knowledge, and platforms for learning and innovation. Unlike R&D efforts focused on commercial applications like traditional 5G wireless development, we dedicate our efforts to underexplored areas of AR and DC that are less likely to be funded, ensuring that technological advancements benefit the entire community rather than only a select few.

This article links to:

[ARDC's Strategic Approach](#)

ARDC's strategic approach serves as a roadmap to align our work with our mission and vision, ensuring long-term impact. Thus, as our vision aims to develop a global community of learners, experimenters, and contributors working together to drive innovation and accessibility, so ARDC's programs (44Net and grantmaking) focus on learning, experimenting, and doing:

Learning: getting more people learning about amateur radio (AR) and digital communications (DC).

Experimenting: getting more people experimenting, innovating, and developing technology (in the context of AR and DC).

Doing: getting more people using new technology productively on more (and newer) bands, modes, and technologies (and other dimensions) within the context of AR and DC.

As we evaluate opportunities for our grantmaking and other program activities, we will be reviewing them based on their ability to meet the above objectives and, overall, help to manifest our vision.

(The above excerpts are snippets - please click the links to read the entire articles for full context.)

I applaud this deep dive thoughtful examination by ARDC into discerning what they should be doing / encouraging / broad outcomes they want to see. With limited resources, organizations cannot be all things to all people / causes / projects.

I read this that going forward, with this new internal guidance, ARDC will now apply its resources most intensely to pushing boundaries in Amateur Radio - specifically by encouraging / supporting

... experimenting, innovating, and developing technology...

ARDC is really the only entity that can do so in Amateur Radio.

And as someone who feels that Amateur Radio has a bright future ahead of it as part of technological innovation in radio technology, I am so glad that ARDC has arrived at those conclusions.

Kudos to ARDC for this hard work!

###

[KrakenSDR Community & Web Mapper Updates](#)

Community News

Over on YouTube various KrakenSDR customers have been uploading videos showing the device in action.

In the first video by 'The Comms Channel', they introduce the KrakenSDR and use it to track down the broadcast location of a small airport's AWOS (Automated Weather Observing System) transmitter.

In the next two videos, Zlati Dimitrov uses a KrakenSDR to track down two transmitters.

In this video, 'Dacomat Laboratory' shows the KrakenSDR being set up in his vehicle and then locating a transmitter.

Next we want to share this talk by Thomas Brinkoetter that shows an overview of how to set up a KrakenSDR system for locating an intermittent interference source.

We also wanted to share a link to this third-party software called 'KrakenScope' by GitHub user 'dotignore'. The software is a desktop mapping application for combining bearing data from multiple KrakenSDRs:

https://github.com/dotignore/KrakenSDR_Desktop/

Finally, we wanted to share a guide created by adrian on our Forums that shows how to install and run our gr-krakensdr GNU Radio blocks on a Windows machine:

https://www.redgo.ch/krakensdr/gr-krakensdr_natively_on_Windows.pdf

I'm surprised that the KrakenSDR has not been mentioned (that I've seen) in general Amateur Radio media. The ability of Amateur Radio to self-police, including the skill and equipment such as KrakenSDR to physically locate transmitters, especially intermittent transmitters, is one of the reasons Amateur Radio has that perception.

KrakenSDR makes the [K2NC Radio Direction Finder unit](#) that I bought years ago (but never used - *price reduced* in the Zero Retries Store) look a bit antiquated now.

###

[WEB-888 vs RX-888 + PC for FT8 skimming](#)

From the NextGenSDRs email list:

I would like to do some FT8 skimming across multiple bands at the same time. WEB-888 seems like a good all-in-one solution. RX-888 with Radxa X4 or Pi5 would put it in a similar price range as a WEB-888. Are there any advantages to go for a RX-888 + PC using OpenWebRx+ over the standalone WEB-888?

I learned a bit from this discussion about WEB-888 and RX-888. I sympathize with commenter's frustration that there's no one way to do things in Linux (versus, for example, Windows). That's one reason for my tendency in Amateur Radio projects / systems that require Linux to "just throw a Raspberry Pi at the problem". That way, each system has the computer all to itself (no battling different applications that want to make their own changes to the system), and (in my experience) [Raspberry Pi OS](#) is one of the best supported Linux distributions and thus it's *easier* to find detailed help instructions.

###



Image courtesy of ALFA Network Inc.

[ALFA Tube-AH 802.11ah Outdoor Radio](#)

Tube-AH

IEEE 802.11ah sub 1 GHz outdoor AP/CPE with single Fast Ethernet and PoE support

1. NXP™ i.MX 6ULL SOC (ARM™ Cortex-A7, 528 MHz) equipped with 256 MB of DDR3L RAM
2. Newracom™ NRC7292 WiFi HaLow™ SOC (IEEE 802.11ah draft 8.0 compliant)
3. 32 MB of SPI NOR flash (optional 2/4/8 GB eMMC)
4. Ethernet with passive PoE and ESD protection (with support for optional 802.3at/af module)
5. Type-N antenna connector
6. 4x LED

Tube-AH is the world's first WiFi HaLow™ outdoor AP/CPE with PoE

The Tube-AH outdoor series allows building long range, ultra-low power WiFi networks in sub 1 GHz license-exempt bands, utilizing compact, mast mounted enclosure.

With powerful ARM Cortex-A7 based SOC clocked at 528 MHz, official OpenWrt and U-Boot support, up to 15 Mbps data throughput and complete SDK for the HaLow™ radio SOC, getting started with this new WiFi standard is straightforward.

Unfortunately, the claim of "official OpenWRT support" doesn't seem valid as this device isn't listed on [OpenWRT's list of supported devices](#). Other products from this vendor are in that list so this might be a cut and paste error (other products in the same form factor) or just careless marketing bluster.

Still, an outdoor 802.11ah / Wi-Fi HaLow device is plenty interesting and might well make for a nice point to point link with directional antennas operating on 902-928 MHz could work better in some situations than a 2.4 GHz or 5 GHz link.

My thanks to the

###

[Interesting Article re: AI and Radio Technology](#)

Paul D. on LinkedIn:

I've been heads down working on something new: experimenting with [Artificial Intelligence - AI] (LLMs, LVMs) and other models for decision making and control of communication systems and software-defined radios.

It's early days, but I'm exploring how these models can play to their strengths in signal processing chains and communication systems. I remember when researchers were trying to replace certain algorithms in signal processing with ML, often in areas where we already had optimal methods. But with these models advancing, it's becoming increasingly clear where AI can actually add value.

I try to remain skeptical of hype, but in this short clip of one of my experiments, I used Claude with the model context protocol (MCP) to communicate with a GNU Radio flowgraph. It worked surprisingly well at finding a signal via waterfall plot and controlling a simulated radio interface to a GMSK modem.

It also produced impressive results for automatic modulation classification from random waterfall plots, something a general model like this probably wasn't specifically trained for. I know similar things have been done in domains like audio, but the generality here feels different.

The quote (that I have no idea where it originated) that "AI technology, today, will be the *worst* it will *ever* be." periodically haunts me when I consider the technological gulf that the use of AI is creating. The implication being that it's literally getting better daily. But such use of AI is not something that we're going to be able to pause, let alone stop. That's like Factory A deciding to stay with water-driven pulley and belt machinery when Factory B has begun to use electric motors. There's simply no comparison.

Thus my mind reels over the potential of not just emulating radio technology that we've had before... but that AI will invent entirely new types of radio technology and modulations.

I remember reading that very high performance military (jet) aircraft diverged from being able to be flown manually by a pilot. To obtain very high performance flight characteristics, it became necessary to design very high performance aircraft to be *inherently unstable*. The only way such aircraft could be flown was to put a computerized flight control system between the control surfaces and the pilot's controls. The computerized flight system automatically made hundreds (more?) adjustments to the control surfaces every second to keep the aircraft flyable (just barely).

I think we're just about to tip over a similar threshold with AI in radio technology systems. There will come a point where an AI will develop a radio communications technology / system / modulation that won't be comprehensible to humans. We won't have any idea how it works, only provably that it does work, and better than any previous (human designed) radio communications system... *as long as there's an AI in the loop*.

Thus it's a bit of gallows humor to joke "I, for one, welcome our new AI overlords to manage this new radio communications system."¹¹

###

[Video - RADE - Machine Learning for Speech over HF Radio \(AREG March 2025 Presentation\)](#)

At AREG's March 2025 meeting, we had a presentation from David Rowe, VK5DGR on the new RADE Radio AutoEncoder digital voice mode!

You can find out more about RADE and FreeDV at:
<https://freedv.org>

David's presentation slides are available here:
https://github.com/drowe67/radea/blob/e4118056466b5f9bfb2cca0f9f8f92e5f58b175e/doc/rade_presentation.pdf

"AREG" is the Amateur Radio Experimenter's Group based in Adelaide, South Australia, Australia. More info about AREG is at <https://www.areg.org.au/about-areg>.

Beginning at 3:45, there is a SSB vs RADE to demonstrate the latter's intelligibility versus conventional SSB transmissions in weak signal conditions.

My thanks to [Amateur Radio Weekly Issue 375](#) for mentioning this video.

###

[Video - Update: Simple Packet BBS Server Deployment \(Quickly Deploy a BBS\)](#)

This is a short (4:32) update to (what is apparently) an ongoing software development project on The Tech Prepper YouTube channel by Gaston Gonzalez KT1RUN.

The video lacks a bit of context if you haven't seen all the videos in this series (which I have not). I found a bit more about the overall project which is called [EmComm Tools](#). The Bulletin Board System (BBS) software that's installed per this update is LinBPQ, and more detail about that is available on the [LinBPQ Guides](#) web page which provides excellent documentation for LinBPQ.

My thanks to [Amateur Radio Weekly Issue 376](#) for mentioning this video.

Getting a radio BBS running for my area is on my list of projects for Summer 2025 in N8GNJ Labs. It will be a lot of fun to see if I can set up a LinBPQ to be accessed via IP400.

Leave a comment

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Comments Summary From Previous Issue

Comments from Zero Retries 0197:

- Recommendation for the TAPR Forum at Hamvention 2025.
- Feedback on comments submitted in FCC GN Docket 25-133.

- Concern about the email gateway feature of VarAC 11.

To receive new issues of Zero Retries every week via email, become a free subscriber. To support Zero Retries, paid subscriptions are appreciated, *but entirely optional*.

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Zero Retries Boilerplate

The [Zero Retries Store](#) is now open for business with quality Zero Retries branded merchandise and items being retired from Steve's N8GNJ Labs.

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing *Thanks* to:

Tina Stroh KD7WSF for, well, *everything*!

Jack Stroh, Late Night Assistant Editor Emeritus

Shrek Stroh, Late Night Assistant Editor In training

Annual Founding Members who generously support Zero Retries financially:

Founding Member 0000 - Steven Davidson K3FZT (Renewed 2024)

Founding Member 0001 - Randy Smith WU2S (Renewed 2024)

Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2024)

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Founding Member 0004 - William Arcand W1WRA (Renewed 2024)

Founding Member 0006 - Todd Willey KQ4FID (Renewed 2024)

Founding Member 0007 - Merik Karman VK1DF / VK2MKZ (Renewed 2024 *with two Founding Member subscriptions!*)

Founding Member 0008 - Prefers to Remain Anonymous 14 (Renewed 2024)

Founding Member 0009 - Prefers to Remain Anonymous 19 (Renewed 2025)

Founding Member 0011 - Rick Prelinger W6XBE (New 2024)

Founding Member 0012 - Ryan Tolboom N2BP (New 2024)

Founding Member 0013 - Newton White N4EWT (New 2025)

Founding Member 0014 - Joe Hamelin W7COM (New 2025)

Founding Member 0015 - Rich Stocking N7OP (New 2025)

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This issue released on 2025-04-18

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1](#)

"Configuration menus in a terminal window" is commonplace now, especially in commercial radio systems that are configured by a "professional". But back then, within Amateur Radio, such an idea bordered on heretical, as in *NO FRONT PANEL?!?!? What are you thinking???*

[2](#)

Differentiation between Amateur Radio and commercial systems - the latter can afford pricey development to implement protocols, modems, networking, etc. into more powerful Field Programmable Gate Arrays (FPGAs) instead of using general purpose computers.

[3](#)

Well, at least those that are lucky enough to be located South of Line A (which runs through much of the Seattle metro area), thus allowing them to use 420-430 MHz.

[4](#)

Now moved to the Zero Retries Interesting Relevant and Interesting Quotes section of the Zero Retries About page.

[5](#)

Credit is due to my friend Larry Gadallah NM7A for this insight. I confess I was initially not very receptive to this perspective. For example, I was sympathetic to FlexRadio for not enabling users to add software / functions to a Flex radio. But I've come around to NM7A's perspective.

[6](#)

My thanks to Ryan Tollboom N2BP for mentioning the SXceiver to me - I was previously unaware of it.

[7](#)

It won't surprise me to see a Raspberry Pi Zero 3 in 2025 with an even faster processor, 1 GB of RAM, and two USB-C ports, both capable of I/O and power.

[8](#)

In another "radio competition" with China versus US, the Chinese radio manufacturers increasingly aren't willing to observe the niceties of the FCC's requirements for different certifications for various radio services such as restricted frequency ranges. You can buy Chinese radios now that operate on Amateur Radio, FRS, and GMRS frequencies, which are all supposed to have "locked down" frequency ranges and unique certifications for each service.

[9](#)

This isn't true. Credit where due - ARRL was a major participant in the initial AX.25 Amateur Radio Packet Radio standard.

[10](#)

I've heard of Saturday nights on LA repeaters back in that era as "Animal House on the air".

[11](#)

Apparently this "overlords" meme originated in... [The Simpsons](#)?!!!!